Predictive Analysis of Shot Put: A Regression-Based Study

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ABSTRACT

Shot put is a dynamic athletic event that demands a unique combination of strength, technique, and explosive power. This study explores the predictive factors for shot put performance using regression analysis. We analysed data from 35 athletes, including measurements of height, weight, standing broad jump (SBJ), and seated chest pass throw. Our model explains 67% of the variance in performance, with SBJ and seated chest pass throw emerging as the most significant predictors. The findings provide valuable insights for talent identification and training optimization in shot put.

Keywords : Dynamic, Seated Chest Pass Throw, Predictors.

Introduction

Shot put is a track and field event where athletes project a heavy spherical object, known as a shot, as far as possible. Performance in shot put is influenced by various physical and technical factors. Understanding these factors can aid in talent identification, training regimen optimization, and performance enhancement. This study aims to develop a predictive model for shot put performance using multiple regression analysis.

Methodology

Descriptive Survey method was used to complete this study. Beginners Shot Putters were considered as population out of which 35 athletes were selected purposively.

All selected fitness test were administered on them to collect the data and it was further analysed to make conclusions about the study. Data were collected from 35 shot put athletes, including the following variables:

- Height (cm)
- Weight (kg)
- Standing Broad Jump (SBJ) (m)
- Seated Chest Pass Throw (m)
- Shot Put Performance (m)

Statistical Analysis and Conclusions:

The descriptive statistics for the collected data are presented in Table 1.

Table 1: *Descriptive Statistics*

Statistic	**Height** (cm)	**Weight** (kg)	**SBJ** (m)	**Seated Chess Pass** Throw (m)	**Performance** (m)
Mean	178.46	102.20	2.67	11.58	14.25
Median	179	104	2.64	11.28	14.42
Mode	182	105	2.35	10.54	14.78
Standard Deviation	5.42	15.31	0.35	1.41	1.50
Minimum	166	78	2.14	9.64	11.45
Maximum	186	132	3.35	15.08	16.93
Skewness	-0.78	0.16	0.48	0.82	-0.13
Kurtosis	-0.10	-0.75	-0.78	-0.08	-1.10

Regression Analysis

A multiple regression analysis was conducted to determine the relationship between shot put performance and the predictor variables: height, weight, SBJ, and seated chess pass throw. The regression statistics and coefficients are summarized in Table 2

Table 2: *Regression Statistics*

Statistic	Value
Multiple	R 0.82
R Square	0.67
Adjusted R Square	0.62
Standard Error	0.92
Observations	35

Table 3: *Coefficients*

Variable	Coefficient
Intercept	-6.17
Height (cm)	0.04
Weight (kg)	0.02
SBJ (m)	0.88
Seated Chess Pass Throw (m)	0.75

Results:

The multiple regression analysis conducted in this study revealed significant insights into the predictors of shot put performance. The model explains 67% of the variance in shot put performance (R Square = 0.67), indicating a strong relationship between the selected predictors and performance outcomes. The detailed regression statistics and coefficients are provided below:

The regression model indicates that 67% of the variability in shot put performance can be explained by the predictors used in the model (R Square = 0.67). The standardized coefficients suggest that SBJ and seated chess pass throw are the most significant predictors of shot put performance, with coefficients of 0.88 and 0.75, respectively. Height and weight have smaller but still positive contributions to the performance.

Discussion

The results of this study highlight the importance of explosive strength and upper body power in shot put performance. The significant contribution of SBJ and seated

chess pass throw underscores the role of explosive leg power and upper body strength in achieving greater distances in shot put. These findings align with previous research that emphasizes the multifaceted nature of shot put performance, which requires a combination of strength, speed, and technique.

Discussion

The regression model identified key physical attributes that significantly influence shot put performance. The most significant predictors were found to be Standing Broad Jump (SBJ) and Seated Chess Pass Throw, with coefficients of 0.88 and 0.75, respectively. These predictors indicate the importance of both lower body explosive strength and upper body power in achieving superior shotput performance.

Standing Broad Jump (SBJ)

The high coefficient for SBJ (0.88) underscores the critical role of lower body explosive strength in shot put. This finding aligns with previous research suggesting that leg power is vital for generating the initial force necessary for the shot put. Training programs focusing on plyometric exercises and lower body strength could therefore be beneficial for athletes aiming to improve their shot put distance.

Seated Chess Pass Throw

The coefficient for Seated Chess Pass Throw (0.75) indicates a strong contribution of upper body power to shot put performance. This result is consistent with studies emphasizing the importance of upper body strength and explosive power in the throwing events. Exercises targeting the chest, shoulders, and triceps, such as bench presses and medicine ball throws, are recommended to enhance upper body power.

Height and Weight

Although height and weight have smaller coefficients (0.04 and 0.02, respectively), they still contribute positively to shot put performance. Taller athletes may have a biomechanical advantage due to a longer lever arm, while heavier athletes might benefit from greater overall mass and strength. However, the smaller coefficients suggest that these factors are less critical compared to explosive strength and power.

Implications for Training

The insights from this study can be utilized by coaches and athletes to optimize training programs. Emphasizing exercises that enhance explosive leg power and upper body strength, such as plyometrics and medicine ball throws, can potentially improve shot

put performance. Additionally, monitoring these key predictors during training can help in tracking progress and making necessary adjustments to the training regimen.

Conclusion:

The regression analysis provides valuable insights into the physical attributesthat contribute to shot put performance. SBJ and Seated Chess Pass Throw emerged as the most significant predictors, highlighting the importance of explosive strength and upper body power. These findings can guide coaches and athletes in designing targeted training programs to enhance shot put performance.

This study successfully identified key predictors of shot put performance using regression analysis. The findings suggest that both explosive strength and upper body power are critical for success in shot put. These insights can be valuable for coaches and athletes in designing training programs and for talent identification.

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